ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by PETER ZODAC

October 1943

Contents for October, 1943

CHIPS FROM THE QUARRY 290

COLLECTING MINERALS AT LLALLAGUA, BOLIVIA. *By Gerald U. Greene* 291

DEAN KAY, LEADING U. S. GEOLOGIST, DIES 294

THE COLORADO NATIONAL MONUMENT. *By W. C. Minor*.... 295

OCCURRENCE OF PREHNITE AT KING PHILIP'S CAVE. *By Giraud V. Foster* 298

THE ROCKS OF MOUNT DESERT ISLAND, MAINE. *By George H. Chadwick* 300

SOUDAN, MINN., IRON MINE 302

PARICUTIN, THE WONDER OF THE HEMISPHERE. Part 2. *By Paul E. Killinger* 304

FIELD MUSEUM OF CHICAGO 50 YEARS OLD 305

CLUBS AFFILIATED WITH THE R. & M. ASSOCIATION 306

SOUTHERN CALIFORNIA LOCALITIES. 12. Tustin. *By Jack Schwartz* 307

CLUB AND SOCIETY NOTES 308

WITH OUR DEALERS 308

R. & M. A. HONOR ROLL 309

COLLECTORS' KINKS (Balsa base for micro mounts). *By Thomas N. Walthier* 309

INDEX TO ADVERTISERS 320

Entered as second-class matter September 13, 1926, at the Post Office at Peekskill, N. Y., under the Act of March 3, 1879

Copyright 1943 by Peter Zodac Title registered in U. S. Patent Office

Specially written articles (as contributions) are desired.
Subscription price $2.00 a year; Current numbers, 25c a copy. No responsibility is assumed for subscriptions paid to agents and it is best to remit direct to the Publisher.
Issued on the 1st day of each month.

Authors alone are responsible for statements made and opinions expressed in their respective articles.

ROCKS and MINERALS PEEKSKILL, N. Y., U. S. A.

The official Journal of the Rocks and Minerals Association

Chips from the Quarry

AN INVITATION FROM THE NATIONAL MUSEUM OF WALES!

To those of our members who may be stationed abroad, serving their country in one capacity or another, an opportunity is often afforded to examine a foreign mineral locality, to call on some foreign collector, or even to visit a foreign museum. Americans might be a bit hesistant about visiting a museum for fear that visitors are not welcomed (during war days) and that there would be little to see as most exhibits have been removed for safe keeping. Not only are museums functioning in war-torn countries, with many minerals still on display, but visitors are encouraged to visit them. Let us cite an example.

Recently we received a most interesting letter from Mr. W. E. Howarth, of the Department of Geology of the National Museum of Wales, Cardiff, Great Britain. One paragraph in this letter reads:

"My colleague, Dr. North, who made a tour of American and Canadian museums some years ago, tells me that Americans may be diffident in attempting to seek access to responsible officials in museums, and I should be glad if you could make known the fact that we shall be at all times willing to meet any of your members who may be in this city and would care to see the collections which are not exhibited, and discuss minerals or other matters of mutual interest. What I say for my own department and institution applies to most museums in Great Britain."

Mr. Howarth is a member of the Rocks and Minerals Association and ROCKS AND MINERALS has had the privilege of printing some very interesting articles which he had prepared for us. He has traveled extensively, visiting many localities throughout the world where he collected a large number of fine specimen. Collectors will be fascinated by his stories of localities visited and specimens collected and the museum itself will amaze them.

The National Museum of Wales is one of the world's greatest institutions. A noted American mineralogist, who has visited many museums, in America, Europe, and elsewhere, has declared that the world's finest displays are in the National Museum of Wales.

An American mineral collector may feel out of p'ace in a foreign country but he is always at home in a museum where minerals are on display. And a warm welcome awaits him at the National Museum of Wales.

Peter Zodac

Buy War Bonds and Stamps
Safest Investment on Earth

ROCKS and MINERALS

PUBLISHED MONTHLY

Edited and Published by PETER ZODAC

October 1943

Vol. 18, No. 10

The Official Journal of the ROCKS and MINERALS ASSOCIATION

Whole No. 147

COLLECTING MINERALS AT LLALLAGUA, BOLIVIA

By GERALD U. GREENE

Cleveland, Ohio

The Antofagasto-La Paz train arrived at the Bolivian city of Oruro at six o'clock one June morning in 1925 and a group of young American engineers, who had been sent to Bolivia to examine the tin mines of Simon I. Potino, sleepily descended to the station platform. June, south of the equator, is a winter month and the cold breezes blowing along the reaches of Altiplano of Bolivia reminded one of the winter Dakotan breezes off of the Manitoban prairies.

We were taken to the Hotel Gran where we demanded a breakfast that only hungry young Americans could do justice to. The hotel attendants assured us that this was impossible as the cook did not appear until much later. We aroused the manager and, after much arguing, sat down to a breakfast consisting of dry bread, fried eggs, and some unpalatable liquid they insisted upon calling coffee. They agreed to do better for luncheon and dinner but seemed to think that anyone who desired to eat in the morning was definitely "loco".

We were forced to spend one day in Oruro. The afternoon of the following day we left for the mining camp of Siglo XX which was to be our headquarters for the mine examination work.

The Potino Mines and Enterprises Consolidated, Inc., is in the district of Llallagua, Bolivia. It is the largest lode tin mining operation in the world. It is in the Province of Bustillo, about 75 miles southeast of Oruro, and is on the eastern watershed of the Cordillera Real of the Andes Mountains. The railroad from Oruro to the mines follows the main line south to Machacamarca, about 15 miles south of Oruro, and then branches off towards the east, passing through the mining camp of Huanuni and terminating at Uncia which is the site of the local government of the district.

The first mill built for treating the tin ores was at Miraflores which is about one mile from Uncia. As the mine was worked to greater depths, an adit was drilled in from the north and a modern mill was built at Catavi to process all of the ore. The Administrative offices of the Company are at Catavi. When we were there the ore was transported to the mill by means of aerial tramways, since then, however, a railroad has been built to transport the ore.

Upon arriving at our camp, Siglo XX, we found that no provision had been made for doing the necessary chemical analyses and no room space was available. As I was the chemist for the party, I was sent to Miraflores where an old building was given us by the administration for a chemical laboratory. The mountain containing the ore veins lies between Miraflores and Siglo XX so it became necessary to establish living quarters near the laboratory. The Superintendent assured me that he would get an excellent cook and took an Indian woman off of the sorting tables at the mine. She had cooked for another white man at some former time, who, unfortunately had died of stomach trouble before she had learned to do much cooking. Apparently no one

connected the two things but after sampling her offerings for a few days I decided she should have been indicted for homicide.

The men chosen for laboratory assistants were taken from the mill and mine. Most of them could speak some Spanish but they preferred using the Quechua language. Although they considered me illiterate, they condescended to teach me enough of their tongue so that we could understand each other. The first few weeks were busy ones and I had no time to collect minerals. I did, however, manage to buy a nice specimen of crystallized cassiterite from a barber in Uncia after considerable haggling over the price. I agreed to his price when I found he was becoming excited and rather careless in the way he waved his razor around my ears.

After about three months the mill at Miraflores was completely closed and the workmen moved to Catavi. We closed the laboratory and moved our equipment to Siglo XX where an adobe building had been erected for our new laboratory.

The analytical method we used to determine the tin in the ores required considerable quantities of hydrochloric acid which was shipped to us in the usual two-liter glass acid bottles. These bottles were much prized by the Indian workmen for their home brew so I decided to work out a system whereby they could have bottles if and when they brought satisfactory mineral specimens. They willingly agreed and the best mineral samples from the mine found their way into the chemical laboratory. However, the workmen only knew a few of the minerals found there and finally started to bring in anything they could pick up. This, of course, meant that a large percent of the material was rejected. Finally, one of my assistants suggested that we go underground and seek the minerals ourselves. I made arrangements with the mine superintendent and thereafter I took the entire laboratory staff, which consisted of ten natives, underground every Saturday night to collect minerals.

Mine A Mineralogist's Paradise

The mine at that time was a mineralogist's paradise. We were given carte blanche and more than once we stopped work at a heading to chip out an unusual specimen. Occasionally we would borrow a stick or two of dynamite to blast out a likely looking spot. Vivianite is often found associated with the ore veins but the best specimens are found in veins in the slate where it is often the only mineral in the vein. Since these are not worked by the miners, we used to blast out some of them to obtain the best samples.

According to Lindgren (1) the tin veins are in slate which is cut by a small stock of dacite-porphyry. However, Deringer and Payne (2) state that the tin deposits at Llallagua consist of a complex system of veins within and contiguous to the Salvadora stock, which is a highly altered quartz-rhyolite or latite porphyry of volcanic origin. This stock intrudes a sedimentary series, probably of Paleozoic age, consisting of a black sericitic graywacke at the base, followed by interbedded sandstones and shales.

I obtained a list of minerals from the Llallagua Mines from the Superintendent. The list is incomplete as other minerals of the vauxite group have been found since then. One peculiarity of the Llallagua mine is the large number of phosphates occurring there and their abundance.

Minerals Found in the Llallagua Mine

Alunite—$K_2Al_6(OH)_{12}(SO_4)_4$
Argentite—Ag_2S
Arsenopyrite—FeAsS
Azurite—$2CuCO_3Cu(OH)_2$
Bismite—Bi_2O_3
Bismuth—Bi
Bismuthinite—Bi_2S_3
Cassiterite—SnO_2
Chalcanthite—$CuSO_4.5H_2O$
Chalcopyrite—$CuFeS_2$
Cuprite—Cu_2O
Cylindrite—$Pb_3Sn_4FeSb_2S_{14}$
Franckeite—$Pb_5Sn_3FeSb_2S_{14}$
Galena—PbS
Greenockite—CdS
Jamesonite—$2PbS.Sb_2S_3$
Limonite—$2Fe_2O_3.3H_2O$
Malachite—$CuCO_3.Cu(OH)_2$
Marcasite—FeS_2
Paravauxite—$FeO.Al_2O_3P_2O_5.5H_2O$

Pyrargyrite—$3Ag_2S.Sb_2S_3$
Pyrite—FeS_2
Pyrrhotite—$Fe_{11}S_{12}$
Quartz—SiO_2
Siderite—$FeCO_3$
Sphalerite—ZnS
Stannite—$Cu_2S.FeS.SnS_2$
Stibnite—Sb_2S_3
Tourmaline—black, formula ?
Vauxite—$FeO.Al_2O_3.P_2O_5.6H_2O$
Vivianite—$Fe_3P_2O_8.8H_2O$
Wavellite—$4AlPO_4.2Al(OH)_3.9H_2O$
Wolframite—$(Fe,Mn)WO_4$
Wurtzite—ZnS

Dr. Frederich Ahlfeld, in his "Los Minerales de la Region Metalifera de la Cordillera del Este Bolivia", does not mention several of these minerals as having been found at Llallagua. He does, however, mention greenockite as occurring there associated with sphalerite and wurtzite. Specimens in my collection show this mineral on wavellite. Senor Hans Block, of La Paz, showed me his collection containing a specimen of apatite and one of monazite from Llallagua. Dr. Ahlfeld also mentions Augelite, $2Al_2O_3.P_2O_5.3H_2O$, as being found there.

The following specimens from my collection are mentioned to show the mineralogical association.

Native bismuth—with cassiterite, bismuthinite, wolframite and quartz. The native bismuth usually has a slight reddish cast but one specimen shows a silvery luster. It occasionally occurs alone with the country rock or with quartz. It is more often found in small pieces in the tin ore.

Bismuthinite—one large piece of very pure material, other specimens show the bladed structure in the usual association with the tin ore. It frequently occurs with quartz.

Cassiterite—this is the principal mineral at Llallagua. It occurs as massive material, as twinned crystals or showing the tetragonal pyramid when it formed in vugs or along the sides of an incompletely filled fracture in the rock. It is found associated with wolframite, bismuth, bismuthinite, vivianite, pyrite, marcasite, and pyrrhotite, quartz, wavellite and the other phosphate minerals. It may occur alone in narrow stringers or along the walls of open fractures. It is usually black because of the dissolved iron oxide but occasionally light brown specimens are found. It may show iridescence. I was fortunate enough to find cassiterite stalactites about 1½ inches long. These are very rare. Crystals embedded in quartz crystals are not unusual. When the mine was deepened one or two veins were as much as 15 feet in width containing principally cassiterite.

Wolframite—this mineral is found associated with cassiterite, bismuthinite, and quartz. One specimen of the tin ore contains a crystal of wolframite about 1x1 inch, the second largest I have seen from Llallagua. Several specimens show smaller crystals with cassiterite and bismuthinite. Wolframite is not uncommon in many veins but the total percentage is very low. No attempt is made to recover it at the mine but since it is very heavy, it is concentrated with the cassiterite and may be recovered at the tin smelter if there are sufficient quantities present to justify its recovery.

Iron Sulphides—Pyrite often occurs as small iridescent crystals on a cellular marcasite. Pyrrhotite is usually massive. One specimen of pyrrhotite seems to be built up of hexagonal plates. Neither the marcasite nor pyrite are particularly attractive.

Stannite—occurs massive in unattractive specimens. It is usually found in the deeper parts of the veins with some of the sulfo-salts of tin.

Arsenopyrite—often occurs as large pieces of pure material. Jamesonite in hairlike crystals is frequently associated with it. Small almost perfect crystals occur in the tin ore proper but are difficult to find underground. The best method is to pick them out by hand from the coarse concentrates from the jigs. A tedious piece of work but well worth while.

Tourmaline—is found at some parts of the contact between the intruded stock and the sedimentaries. The crystals are small, black, and unattractive.

Phosphate Minerals—Wavellite is an abundant mineral at Llallagua. It occurs as coatings on many of the ore minerals

and on the wall rock. It may form very thin layers or may form pieces several inches thick. One specimen, about 4x5 inches, resembles a sponge. It often shows well developed small crystals on quartz. The best quartz crystal that I obtained was about four inches long and was coated with wavellite. Many smaller quartz crystals were found which were coated with this mineral. They are beautiful specimens.

Vivianite—Occurs as either deep blue or bluish-green crystals, or as bluish-green earthy masses. The mineral may occur in the tin ore but it also occurs in veins by itself. The material from Llallagua is much better than any I have seen from the States.

Vauxite and paravauxite—These minerals occurs in small crystals usually on wavellite but often associated with marcasite which may have partially oxidized. Since the oxidation products occupy a larger volume, these specimens are usually fractured and gradually disintegrate. Another phosphate mineral was found while I was there that has not been determined to my knowledge. It is a calcium phosphate but does not conform to any chemical analysis of listed phosphates. It is fluorescent.

Quartz—is an abundant mineral at Llallagua. It occurs as excellent crystals up to about four inches in length. The prisms taper and are capped by the hexagonal pyramid. It occurs either in the ore or as linings in open fractures.

Opal—to my knowledge this mineral has never been reported from this locality. However, two specimens show opal pseudomorphous after quartz.

Greenockite—usually occurs as a thin coating either reddish or yellow. It is often found on wavellite. The yellow material, which is more common, resembles limonite underground and for this reason is often overlooked by collectors.

Monazite—several specimens show very small crystals of a mineral that resembles monazite. It is found in vugs in the tin ore.

Argyrodite—one ore sample contained considerable germanium, this was not known until the sample had been crushed. It was not a regular sample and no one remembered what part of the mine it was taken from. No more was found. The other minerals listed are rare and are found in unattractive specimens. Many collectors do not even seek them since they are found in other Bolivian localities in good specimens. Cylindrite at Poopo; Franckeite at Poopo, Huanuni; the silver minerals from Colquechaca and Potosi, and wurtzite from Monserrat.

The collector visiting Llallagua today would probably have difficulty in getting good specimens of most of the minerals since the larger veins are fairly well worked out. When I first arrived there was still sufficient high grade to permit hand sorting and the picking tables, surrounded by the Indian women with babies on their backs, was a favorite spot, unfortunately for Llallagua those days are gone forever.

REFERENCES

(1) Mineral Deposits by Waldemar Lindgren. p-656.

(2) The Ore Deposits of Llallagua by D. C. Deringer and John Payne, Jr. Engineering and Mining Journal. Vol. 138 p-171.

Dean Kay, Leading U. S. Geologist, Dies

Iowa City, Ia. (U.P.)—Dean Emeritus George Frederick Kay, 69, dean of the University of Iowa college of liberal arts from 1917 to 1941 and a leading U. S. geologist, died Monday night, July 19, 1943, at the university hospital.

He had been suffering from cancer of the stomach and had been bed-ridden since May.

As an authority on middle west geology, Dean Kay headed the geology department at the university from 1911 to 1943.

Under his direction, the department's enrollment grew from 150 to 850 students and approximately 1,200 students took his course, "geology and man" in his 36 years at the university.

He also was responsible for the establishment of the schools of journalism, fine arts, letters and religion as liberal arts dean.

He was a leading authority on the glacial and inter-glacial history of Iowa and other midwestern states and was state geologist and director of the Iowa geological survey from 1911 to 1934.

Waterloo (Iowa) Daily Courier July 20, 1943.

THE COLORADO NATIONAL MONUMENT

By W. C. MINOR
Fruita, Colorado

A place where half the real estate stands on end is a term that could aptly be used to describe the Colorado National Monument, for this unique scenic wonderland consists mainly of deep, rugged canyons, fantastic rock formations, and miles of towering, perpendicular red walls and cliffs hundreds of feet high and as straight up and down as the side of a brick building.

Established by presidential proclamation May 24, 1911, the Monument consisted of some 14,000 acres. A few years ago the western boundary was extended to take in Fruita Canyon and other scenic spots through which the Monument Rimrock Road now passes. The total area of the Monument is now 18,310 acres. It is located in the northwestern part of Mesa County in the western part of Colorado, about 15 miles from the Utah line.

Each of the various national monuments is set aside to preserve some especially noteworthy feature either scenic, geological, or historical, and each monument is unique in its way and does not duplicate the attractions of any other national park or monument. The most noteworthy feature of the Colorado National Monument are the many magnificent examples of massive erosion that it contains which make it a region of more than passing interest both to lovers of scenic beauty and to students of geology.

The dark gray-black granite exposed along the creek beds in the bottom of the various canyons may be called the foundation of the Monument and is sometimes called the foundation of the earth itself. For these ancient granites of the Archeozoic and Proterozoic eras are some of the oldest rocks on earth. Geologists say that this granite appears much the same today as it did 500,000,000 years ago, and place the date on which the molten granite first began to cool at almost 2,000,000,000 years ago.

Above the granite lies the red Dolores sandstone of the Triassic age. Topping the Dolores formation the gray-white La Plata sandstone, also of the Triassic age, forms a cap rock around the heads and upper rims of the canyons.

The canyons that forms the main attraction of the monument, together with the great stone monoliths, huge balanced rocks and other fantastic formations, are all carved from the red sandstone. This ever present touch of red color is one of the distinctive features of this region. Artists say that red and green are contrasting colors that should never be placed side by side in the same picture. But the master artist, old Mother Nature, evidently does not abide by this rule, for red and green are the dominant colors of the region. Red rocks, red walls, red canyons and throughout it all, wherever they find a spot level enough to grasp or a handful of soil in which to grow, forests of low-growing junipers and pinons lend their touch of deep green color to the scene.

Independence Rock is the most famous of all the great monoliths of the Monument. It stands alone in the center of Monument Canyon, completely apart from the surrounding walls, a long, slender finger of stone pointing five hundred feet toward the sky. The Coke Ovens are a string of huge, four hundred foot monoliths, tapered or rounded at the top, that resemble a row of gigantic stone jugs standing on a shelf. The Garden of Spires contains dozens of monoliths of strange shapes and noble proportions. The Toadstool in Monument Canyon and the Double Balanced Rock in Fruita Canyon are the largest balanced rocks of the Monument.

Monument Canyon is the largest and best known of the numerous canyons in the Monument and contains some of the most magnificent rock work. Until quite recently cars could be driven only to the mouth of Monument Canyon and only hardy hikers were privileged to explore

the upper reaches of the canyons. But since the construction of the Monument Rimrock Drive, visitors may roll around the rims in luxurious ease and enjoy some of the most magnificent views at the expense of no greater effort then that required to stop their cars at designated parking places and walk a few steps to the rim.

The ancient granites and Triassic sands of the Monument region are not especially rich in minerals. However, the writer has at various times found specimens of the following:

Agate; banded, moss and in thunder eggs.

Amethyst; small pieces not gem quality.

Aragonite; crystalline masses, round pebbles and type oynx.

Jasper; red, brown, yellow.

Quartz; clear, milky, rose.

Quartzite; tan, white, black, green.

Opalized Wood; small scattered pieces.

Sand Concretions; many odd shapes, colors and sizes.

This makes no claims at being a complete list, but is merely specimens that the writer has personally found. Very likely some of the material listed did not originate in the Monument but was washed down into the canyons from the higher mesas, and more recent geological formations to the south. To be sure, removing mineral specimens from a national park or monument is not permitted. But the writer hunted specimens over much of this region before it became a national monument.

A few small pieces of fossilized dinosaur bone have been found in the Monument. However, the best known of the western Colorado dinosaur beds lie to the west and north and are outside the boundaries of the Monument.

Those interested in the natural sciences other than geology and mineralogy will also find much of interest here. During the spring months the canyon floors and the high slopes above the rims flame with hundreds of species of wild flowers to intrigue the botanist. While the entomologist will be interested in the fact that some of the rarest of North American butterflies have been found here.

Buffalo, deer, elk, coyotes, bob-cats, fox and numerous smaller animals inhabit the canyons. The buffalo are semi-domesticated and are frequently seen and photographed by visitors. All the other animals live entirely in their wild, natural state and are seldom seen. Across the mouths of the canyons, along the northern boundary of the Monument, a high buffalo fence eight and one-half miles in length has been built to keep these animals from straying out into the fields and orchards of the adjoining Redlands.

The recently constructed Monument Rimrock Drive is a feat of engineering that required no small ability. When the plans for the road were first being discussed, skeptics said it couldn't be done. But it has been done, even if the cost to date is said to have been over two million dollars. The road is now open to the public and has been for about four years, though it is being constantly improved and there yet remains much work to be done on it.

With the scenic wonders of the Monument thus made easily available, increasing numbers of tourists are taking this side trip over the Rimrock Drive. It takes them but a few miles off the main highway and requires only an hour or so more time.

Motorists coming from the east on highways U. S. 50 or 6-24 may leave the highway at Grand Junction, cross the Colorado River on the Main Street bridge and take the road to the Serpent's Trail, the east entrance to the Monument. The Serpent's Trail, built several years before the rest of the Rimrock Road, winds and twists its way up the west side of No Thoroughfare Canyon with many a loop and switchback. It is claimed that this stretch of the road contains more loops, switchbacks and hairpin curves than any other highway of equal length in the world.

In a short time you have reached the rim some two thousand feet above the valley. The road then swings over to the east rim of Red, or Columbus, Canyon.

It circles around the head of this canyon and heads west to the rim of Buffalo Canyon. Then rounds the heads of Buffalo and East and West Monument and swings down along the west rim of Monument Canyon. At numerous points the road swings so close to the rim that you can look almost straight down into the canyon. And at some places it has actually been blasted from the face of the cliff.

In the depths of the canyon below, the Coke Owens, the first of the great monoliths, come into view. Then the Garden of Spires, Jefferson Monument, the Senatorial Group, the Sentinel and others, and several magnificent views of Independence Rock.

At various places along the rims you may look down on the towns of Grand Junction, Fruita, Loma and Mack. Far below the irrigated fields and orchards of the Grand Valley lie spread out like a huge map. In the background, across the Grand Valley to the north, rise the precipitous, lilac-gray, desert slopes of the Book Cliff Mountains, while ever to the eastward looms the great blue bulk of Grand Mesa—the world's largest flat top mountain.

After passing the checking station and park headquarters, the road leaves Monument Canyon, swings around the head of Fruita Canyon and follows down the west rim of this canyon with many a twist and curve until it reaches the rim overlooking the valley. It follows down this rim a short distance then swings back and enters Fruita Canyon through a tunnel. Almost immediately it passes through a second tunnel and completely circles the inside of the canyon then again comes out on the north face of the cliff which it follows almost to the mouth of West Monument Canyon. Making a hairpin curve, it follows back along the north face at a lower altitude, reenters Fruita Canyon through a cut and comes down to earth at the mouth of this canyon after traversing some twenty miles of awe-inspiring scenic beauty that rarely fails to thrill even hardened world travelers.

Visitors from the west may merely reverse this procedure, leave the highway at Fruita and come back onto it at Grand Junction.

To enable one to say that he has really seen the Colorado National Monument he should explore the floor of the canyons as well as view them from the rim. But when time is pressing even a hasty trip over the Rimrock Drive is well worth while and certainly worth two hours of anybody's time.

And don't forget your camera.

Independence Rock in the Colorado National Monument.

Do Your Share!

BUY ALL THE WAR BONDS AND STAMPS YOU CAN.

OCCURRENCE OF PREHNITE AT KING PHILIP'S CAVE

By GIRAUD V. FOSTER

St. Paul's School, Concord, N. H.

One of the largest and yet perhaps the least known prehnite locality is in the Farmington, Connecticut, area. Although recognized by many authorities, it is not often visited by collectors. This occurrence is very similar to that of Paterson, New Jersey, in as much as the specimens appear identical. The leading locality in this vicinity, where deposits of this mineral are more abundantly found in good condition, is Farmington Mountain, sometimes referred to as Rattlesnake Mountain. It is here that the mineralogist can collect some good specimens. The prehnite is found in close association with zeolites, quite similar again to that of specimens found in the Paterson localities. The matrix is a dark aphanitic basalt. Occasionally specimens are found which bear incrustations of fine dog-tooth calcite. Few other minerals are found. In color the prehnite ranges from a dazzling snowy white to a very deep green. The specimens themselves are quite typical of the mineral. It is usually found in the rounded globular masses which are so common in prehnite. The crystals in such specimens are very small and it is rarely that one ever finds a crystal of large size showing any signs of its orthorhombic symmetry. Large size specimens covered with glistening crystals are still to be found in some of the nearby caves which I intend to tell about. Specimens of this nature are imbedded in rock and special efforts should be taken in order not to harm such good deposits. Too often the collector in his haste damages prize examples which with a little more care could have easily been removed. I would like to suggest to any one planning to hunt for specimens in this area that he procures for himself such an implement as a screw driver or any other such tool with which he might pry away the surrounding rock.

As to the exact locality I should like to recommend two caves which I have found to be unusually well supplied with this mineral. These caves go locally under the names of Big and Little King Philip after the famous Indian chief who led the raid on the inhabitants of Farmington in the latter half of the seventeenth century. Rather, as the story goes, he is said to have directed the fighting from the larger of the two caves. The site of this locality is west of Hartford on the Farmington-Hartford cut-off. Farmington, or Rattlesnake mountain can easily be recognized for on it there is both a large and outstanding white brick tower and a radio station whose two antennae can be seen from far off. One should not find any trouble in locating the area, if so any one could be directed to the radio station by any local inhabitant. The exact spot where the specimens are found is about one-third the way up the hill under the white brick tower between a contact of red sandstone and basalt, the sandstone being on top. A large cliff of this basalt can not be missed while passing on the road. It is advisable, in trying to reach the caves, to climb the mountain first and take the path which is to the left of the tower when one faces the cliffs and descend along it. Special care should be taken for the path is not very wide and there is a possibility of severe injury if one should fall. This path should be followed for about one hundred feet when it comes to the smaller of the two caves. This cave is about three feet above the path but can easily be reached without much effort. The opening is not very impressive, I should say that it was about seven feet high and about ten feet deep. Prehnite specimens of fair quality can be collected here, but because this is the easier of the two caves to get to, its supply of this mineral has been pretty well exhausted. However on the slope below for some one hundred feet fragments can be collected which often contain good specimens. These specimens on the whole tend to be somewhat weathered but I have collected my

best ones in and around this area. If one follows the path for about another three hundred feet one comes to the original cave which is not so conspicuous. The path becomes much narrower and again one must be careful with his footing. This cave is about twenty feet up from the path and can be reached either by a wire cable which is suspended from a tree overhead or by climbing along a crevice which starts approximately twenty or thirty feet away from the cave continuing onto the path. Both approaches are quite hazardous but the results are very satisfying. The cable I would suggest as the safer, however, the choice is up to the climber.

When once inside the cave, a much darker variety of prehnite can be found, such as might be desired to be used as a semi-precious gemstone. In certain places the walls are just lined with this mineral. However, it is advisable to bring along a brush and a flash light for too often the specimens are covered with a reddish mud which makes them appear very inconspicuous. This film can easily be removed by a good stiff brush and some soapy water. Careful examination of the cave will show that there is much fine material hidden by this mud. This cave is considerably larger than the other with dimensions that I might judge were about ten feet high and twenty feet deep. From the cave can be seen a most marvelous view of the surrounding country—no wonder that King Philip choose this place to be his observation point. Heavy clothes should be worn for not only is the cave damp but it is also very windy. A visit to this cave during the winter is not to be recommended for one would then find it a most uncomfortable trip.

Below the cave and down the mountainside fragments are again available as they were in the case of the cave previously mentioned, however there are not quite as good findings here. If one continues along the path, one will encounter a series of about four geodes of dog-tooth calcite in the side of the embankment. These, however, have unfortunately been marred by inexperienced collectors leaving them rather shabby. Undoubtedly there are perhaps more of the same nature which have escaped harm but they were not brought to my notice during my explorations of this vicinity.

The path ends abruptly in another hundred yards or rather I should say that the way becomes practically impassible, yet I do not believe that much material of any interest would be found any further than this point.

The reason I believe that this is such an interesting locality is that I feel that it is not very often visited. The difficulty in reaching, it is perhaps a reason for this, but collectors have been known to take far greater risks in order to procure choice specimens. Undoubtedly another reason is that many people have found it hard to find the exact locality where the specimens are more abundant.

Other minerals found in this vicinity and in the nearby surrounding country are agate, amethyst, calcite, and diabantite in trap rock matrix. These are found occasionally in the area surrounding the caves themselves. Some of the copper carbonates are said to have been found, but I have not had any luck in finding any. These are considered a rare find in these parts. Limited amounts of stilbite and chabazite are also found in the trap rock quarries at Farmington which are situated only about half a mile or so away from the prehnite locality on Rattlesnake Mountain. These quarries, so I understand, have been worked extensively, but good specimens can still be obtained.

A good day's collecting can be had at either of these two localities, however I would suggest the King Philip's Cave as the more interesting. To my knowledge it is hardly ever visited by collectors, and so adds a touch of exploration to the day's enjoyment.

THE ROCKS OF MOUNT DESERT ISLAND, MAINE

By GEORGE H. CHADWICK

To thronging visitors atop Cadillac Mountain, with its circumambient panorama of Maine's tattered shoreline and serried hills, the Ranger-Naturalist of Acadia National Park was wont to say: "You are standing on the roof of Hades".

Cadillac granite, which surfaces more than half of the hundred square miles of Mount Desert Island, including its 10-mile long mountain range and many of the lesser hills, rose indeed molten out of the kingdom of Pluto, in late Mississippian time, into a vast thickness of overlying rocks since vanished into thin air and ocean depths by the age-long process of erosion. The present summits of the mountains mark the uppermost reaches, or "cupolas", of the Mount Desert bathylith, resisting stubbornly the tooth of Time that has gnawed away the surrounding softer "roof" and "wall" rocks, leaving the original contour of the granite bathylith neatly etched out and subsequently only moderately affected by the overriding ice-sheet of "yesterday".

Everywhere are the signs that this white-hot liquid "magma" made its way quietly, if relentlessly, into its host rocks, swallowing them piece-meal by the process of "stoping". Blocks of all sizes of the older rocks are seen, along the present granite margin, frozen in the very act of engulfment, the molten granite having penetrated every crack and crevice in them. Thus they were gently eased apart along their natural joints and cleavage planes, to subside into the cauldron that Pluto had stewed up. "Divide and conquer" is a motto as old as Earth itself. Fine examples of such mosaics (intrusion breccias) are to be seen at the east end of Sand Beach or at Hunter's Beach Head, both on the Ocean Drive.

Between the domes or cupolas of the granite, the older rocks hung down like dividing curtains (roof-pendants) whose subsequent removal by erosion has given origin to the dividing valleys. Such of these passes as crossed the main mountain range, in the general direction of glacial flow, have been widened and overdeepened by the crowding and speeding-up of the ice movement in those narrows. Thus have been scoured out the dorrs or glacial troughs that open and shoal at both ends so as to hold rock-basin lakes (dorr lakes) in these U-shaped glacial notches, so like the Adirondack lakes. One such trough lies, however, like the pass of the Hudson through the Highlands or of the Saguenay between Capes Trinity and Eternity, submerged beneath the salt water of Somes's Sound, and has been referred to in the literature as a fiord. But it opens into lowland at both ends, hence it too is a dorr, a glaciated breach in a mountain range.

Trap dikes of Triassic age conspicuously cut the granite and may be followed over the highest mountain tops and down under the sea. They have surprisingly little effect upon the topography and only rarely do they occasion the numerous sea-chasms along the shore. At Thunder Hole, for example, the much-visited chasm is worn in solid granite by a process like that producing potholes, although only three rods away a small trap dike lies parallel. The granite is cut also by narrow veins ("pink dikes") of its own aplite, examples of which a trained eye will detect on Cadillac summit, and by very thin veins of green epidote, as at Thunder Hole.

Older than the granite, which often holds large blocks of it, is the Prettymarsh diorite, handsomely coarse in larger masses, mostly westward, but fining into diabase or dolerite (trap) in frequent dikes such as those well exhibited at Reef Point along the shore path at Bar Harbor. There is an "older look" to these dikes that will distinguish them from the later trap on longer acquaintance. At Reef Point appear also two small dikes, each about 18 inches wide, of pinkish rhyolite (Ireson felsite) older than the diorite and more involved in the

folding of the host rocks.

Both diorite and felsite have formed laccoliths (lava blisters) in the old stratified sediments that are their host. Most conspicuous and (from a boat) most easily studied of these laccoliths are the five Porcupines (islands) inclosing the anchorage at Bar Harbor. These are diorite. Entering strata already slightly canted to north, the lava rose higher and steeper at the south end, a form since accentuated by weathering, glaciation and wavework after the roof was stripped away, giving the suggestion of five little beasties swimming out to sea. On the south side of each Porcupine, the floor of Bar Harbor sedimentary strata has been lifted to view, a few rods above the surf, and the dark dikes running up through it to feed the laccolith are in plain sight, especially on Burnt and Long Porcupines. In the high cliff where the glacier clipped off the southeast end of the latter may be seen even from Bar Harbor a vertical cleavage resembling the familiar columnar jointing of the Palisades of the Hudson, of East and West Rocks at New Haven, or of Mount Tom near Holyoke, and due to the same cause though in much older rock. For the Prettymarsh is Upper Devonian (Chemung) in age, the Ireson early Devonian.

Ireson Hill, on the north shore of Mount Desert, is a felsite laccolith, best studied by walking the beach at low tide from Sand's Point past The Ovens. It is many times larger than the diorite laccoliths, the main highway running over the top of it at "Dreamwood", and none of its roof-rocks remains, whereas on the north shores of some of the Porcupines such remnants may be found, notably on the northwest corner of Bar Island, the nearest one, which alone may be visited (at low tide) without a boat. White granites dikes there cutting both lava and sediments are also worth seeing. Sol's Cliff and the Great Head hill are diorite laccoliths on the main island.

The above are the intrusive rocks of the Island. What they intruded were stratified rocks of Silurian and of early Cambrian age, as well as one another—first the felsite, then the diorite, the granite, the trap. But the stratified old rocks were themselves partly of volcanic origin. All that the granite and diorite have left undevoured of these strata is a narrow rim around the shores of the Island, on the east half and in the southwest lobe the Silurian series (Frenchman's Bay), on the west and northwest sides the early Cambrian (Etcheminian) Bartlett's Island schists, on which the Silurian rocks rest highly unconformably at both junctures. The Silurian show as the ordinary Bar Harbor "flags" along the shore path in the village, but even there an occasional white-weathering layer of volcanic ash is interbedded, a striking mass of it lying also on the south side of Burnt Porcupine. Around Bar Harbor the strata are not very greatly folded, though sufficiently baked by the warmth of the great granite bathylith to have lost all trace of fossils.

But southward, even at south end of the shore path and on Ogden's and Dorr's Points to south, blue felsite lava flows begin to be interbedded and thence to increase in number, as do the ash beds, and to be more and more upturned and folded until on the Cranberry Islands but few of the "flags" are present but all is steeply upedged volcanics. Although actual continuity of these rocks is much interrupted from Great Head to Seal Harbor by granite reaching down to the shore, there is no doubt today that the Cranberry Island volcanics and the Bar Harbor detrital strata are merely two phases of a single deposition taking place during "Clinton-Niagara" time. Not far west and east along the coast these rocks carry the fossils of that time; some day some lucky hunter will find them on the Cranberrys or on Mount Desert.

"Hell was popping here in them days". Just where the vents were is not fully known, but the shore exposures at Anemone Cave show such a stewed-up mess as might form in the throat of a volcano, later invaded by the diorite and veined by the granite, with epidote also. Farther south, on the southwest tip of Otter Point, huge foundering blocks of the volcanics, with still some "flags", are inclosed by Cadillac granite on all sides, even overhead in the Jonah Rock.

On opposite side of Mount Desert the more ancient schists attract attention by the brilliantly glittering mica of their highly crinkled laminae usually of green chlorite (sometimes biotite or muscovite) interleaved with white quartz (1 to 2 mm.); there are occasional layers of white quartzite and many irregular lenses or stringers of quartz. Dr. Alling's microscope has revealed to him that these quartz lenses and even the tenuous interlaminae of quartz are "lit-par-lit" injections from a molten magma, and that some volcanic ash also was present throughout the original shale, so that the schist is of triple composition. A clew to this is found on the north shore between the highway bridge to the mainland and the point to east called "Uncle Israel's" in a mass of ancient intrusive syenite composed of white feldspar and a green amphibole like actinolite, now except for one portion in the center mostly converted into a white gneiss cutting out the schist and itself cut by dikes of felsite, diorite and trap. Withdrawal of the quartz from this into the schist may account for its peculiar lithology.

One rock remains, the most remarkable of all. The southwest lobe of the Island consists peripherally of the same blue volcanic felsites as on the Cranberry Islands to east, beautifully porphyritic at Tryhouse Point in Bernard village, but centrally and over a wide area there occurs a pink "sugar granite" at first sight easily mistaken for Cadillac, especially at Seawall where it is as coarse as that; but the quarrymen know better and will not touch it. Yet this rock grades directly into the blue felsite at every place where the two can be found together. The conclusion to which we we are forced is that the felsites have locally been altered by hot gases and steam arising from an underlying molten magma supposedly the Cadillac, and recrystallized into a pseudo-granite or more generally a pseudo-aplite of finer grain than at Seawell by a process of metasomatism or pneumatolysis. It is in this rock that occur some of the more notable minerals of the Island.

SOUDAN, MINN., IRON MINE

The Soudan Mine has been a producer of hematite for about 56 years. It is a large mine and the only one in operation in the area—years ago there were 8 mines around Soudan. It is worked by a shaft which has been sunk to a depth of 2,100 feet. The mine is electrified throughout and is in continuous operation. Most of the waste rock is hauled out of the shaft and thrown on the dump —some of it is used underground for back filling old workings.

Location

Soudan is a village of about 1,300 population in northeastern Minnesota. It is at the south end of Lake Vermilion in the northern part of St. Louis County—about 96 miles north of Duluth. The mine is in the famous Vermilion range of the Lake Superior iron ore deposits.

Geology

According to Ries[1] the chief ore deposits of the Vermilion range occur in the highly folded and metamorphosed Keewatin rocks of very ancient geologic age and the iron formation is largely altered to jasper. The country rock is mostly greenstone in which the jasper occurs in basins or troughs. The ores associated with the jasper in these troughs have a greenstone footwall and consist of dense hard red or blue hematite, which is sometimes brecciated but rarely specular.

Mineralogy

A number of interesting minerals occur at the mine and have been collected by Mr. Oscar J. Korpi, of Soudan, who has distributed them among collectors all over the country. In a recent letter to ROCKS AND MINERALS Mr. Korpi said: "They get some very large and beautiful quartz crystals—green, red and various

1 Ries, Heinrich, *Economic Geology*. John Wiley & Sons, Inc., New York City, 4th Ed., 1916, p. 532.

colors—but try to get them from the lucky miners who get into the vugs first".

Among the minerals found by Mr. Korpi are:

Azurite: Bluish incrustations noted on old timbers in the mine.

Chalcopyrite: Massive, associated with massive pyrite in bluish hematite.

Chlorite: Common as dark green minute flakes and crystals on rock crystals. Chlorite is often enclosed by rock crystals and often in such amount as to give the quartz a dark green color.

Dolomite: Occurs as tiny brownish crystals on quartz crystals; also as groups of drusy brownish crystals on drusy pyrite which in turn is on drusy hematite.

Hematite: Occurs massive, crystalline, and crystallized all of good quality and generally associated with pyrite. As massive it is dark brown to red to gray to blue (gray and blue are very hard). Sometimes the gray or brown is bordered by red,

As crystalline, it is black and red in color.

As crystallized, it is black in color.

Also hard, red specular.

Hematite has also been seen in small blood-red, earthy masses filling cavities in pyrite; also as blood-red films on quartz.

Hematite is the ore of the mine.

Malachite: Greenish incrustations noted on old timbers in the mine.

Olivine: Small quantities have been found.

Pyrite: Occurs massive and crystallized with hematite and of good quality. The crystallized varieties deserve more than passing attention. The majority appear to be cubic in form which have been deeply etched leaving fantastic formations. Others appear to be masses of parallel plates, and the tiny vertical walls of these plates are grooved or striated resembling quarried walls of miniature marble quarries.

Occurs also as small to large "marbles" which vary from ⅛ up to 2 inches in diameter. These were found embedded in earthy graphitic "clay".

Quartz (Ferruginous): Occurs either as isolated slender crystals or as groups of slender crystals. As isolated crystals, they have been seen projecting out of little cavities in pyrite.

Beautiful gemmy slender rock crystals, up to 1½ inches long, with a reddish tinge, were crystallized on hematite. Often the crystals were coated by tiny reddish crusts of hematite, by tiny brownish crystals of dolomite, or by both.

Massive milky quartz was noted heavily stained by iron.

Quartz (Jasper): Red, massive, specimens that are bent, twisted or otherwise deformed are common.

Jaspers from Soudan take a nice polish and they are especially attractive when banded with hematite.

Quartz (Milky): Massive and sometimes roughly crystallized, has been seen associated with massive hematite. At best it is only of fair quality.

Quartz (Rock Crystals): Beautifully crystallized in long slender crystals, though commonly tinged red by hematite or else encrusted by it. These are found in the vugs and cavities in the mine.

A unique specimen consists of a group of three rock crystals each of which is encrusted by three mineral crusts one on top of the other. The first crust is drusy red hematite, next a pyrite crust, and the top is a brownish dolomite crust. This specimen has been described in detail by Zodac.[2]

Quartz (Smoky): Beautiful crystals occur here associated with pyrite on hematite. Many of the quartz crystals enclose black platy crystals of hematite.

Massive smoky quartz was noted so heavily stained by iron as to be taken at first glance for red jasper; rock crystals encrusted one face of this quartz, and rock crystals stained red by iron plus a tiny group of crystallized chlorite encrusted the other face.

Acknowledgment

Thanks are due Mr. Korpi for furnishing many specimens from the mines and for notes covering their occurrences.

2 Zodac, Peter, "A Unique Quartz Specimen". ROCKS AND MINERALS, March, 1937, p. 89.

PARICUTIN, THE WONDER OF THE HEMISPHERE!

By PAUL E. KILLINGER

120 W. Winspear Ave., Buffalo, N. Y.

Part 2. Its appearance on June 30th, 1943.

On June 30th, 1943, my second journey to the still very active namesake of the God of Fire was made. This time we rented a car to go from Uruapan to San Juan and my companion was another friend, Arturo Barcenas, of Mexico City.

At about 1:30 a.m. on this Wednesday morning the far off sight of this stage with the forces of Nature as the actors, greeted me again. The show had been greatly bettered and enhanced by Nature through her unapproachable direction.

The territory for about 2 miles around the volcano was illuminated by the glowing lava from a new crater about halfway down the northeastern side of the cone. This crater, formed only 24 hours before, was continually pumping lava with a sound like that of a heavy water pump. It then flowed down a slope of about 25° to a broad wall where it cascaded down for about 300 feet. The lava then extended into a glowing river about 1½ miles long, which extended towards the town of San Juan.

We approached to within a few feet of the steadily advancing front of the lava flow. The outer rocks had cooled below the point of incandescence, but every moment, however, part of the lava front would fall or be moved in some way, thereby exposing, in places, the white hot material underneath. The sound within the flow might have been compared to the grating of a large mortar, and as the flow was still alive this sound was attributed to the grating together of the moving lava blocks inside and at the bottom of the flow. We estimated that the lava was advancing about 30 feet per day.

As we had rented horses for about 12 hours, we decided to see how close we could get to the base of the cone. As the least number of explosions threw debris towards the northwestern side, we circled towards this side of the cone. Enroute it was necessary to detour around the second flow which had reached the outskirts of the town of Paricutin. This quaint little town gives one an idea of the destructiveness of a volcano. Two homes at the outskirts of it were destroyed by the lava and the rest of the town made uninhabitable by the vast quantities of dust showered upon it. A great many of the houses roofs were collapsed and all of them almost buried. Although the church was partially destroyed by an earthquake a year ago, it, too, suffered more damaged.

We finally reached a level spot about 50 yards from the base of the cone. At dawn we built a fire, using a piece of red hot lava as the kindling agent, and unpacked our cameras, hammers, and chisels. Senor Barcenas and I attempted to reach the new crater from here but were driven back by a wind-driven rain of wet dust, and as we approached the northern side, by the falling volcanic bombs. We collected some lava specimens as well as incrustations from the fumaroles, on our way back to the horses.

After we had returned we laid our rubber raincoats down in front of a large rock and laid back against it. Due to the fact that this rock was still somewhat warm, we felt quite comfortable, as the mists from the damp volcanic sand rose before the rays of the rising sun.

Before us was the still ever changing scene. The billowing grayish smoke (the color of the smoke had changed since May) was ever changing. Now and then an explosion would come our way and the semi-molten lava blocks would come clattering down the slopes

---

EDITOR'S NOTE: Paricutin, the world's newest volcano, made its appearance at 5:30 p.m. on Feb. 20th, 1943, in the state of Michoacan, Mexico. The first part of an interesting series of articles on the volcano, by Mr. Killinger, appeared in the September, 1943, issue of ROCKS AND MINERALS.

above us to come to rest in the slight depression that was between us and the base of the cone. At times we could hear a piece come whistling down and land with a heavy thud some distance to our left.

The plumes and fountains of red hot lava bombs were still being expelled but they did not seem to reach such great heights as they did when I first visited Paricutin. I deducted that this change was probably due to the fact that the volcano's energy was being expended to a greater degree in expelling lava from the newly formed crater.

While we were resting and watching here, we noticed that the earth was almost continually shaking and that every-time the rocks were thrown a little higher than usual, these earth tremors were more pronounced.

The fumaroles on the first lava flow (described in Part 1) seemed particularly active at that time.

About 8:00 this morning we remounted our horses and rode back to San Juan.

It seems to me, now that I look back on this visit, that all Nature's forces of volcanism were there shown on one vast stage. The new crater pouring forth the fluid rocks, the smoking, rock-shooting crater and the fumaroles of the lava field, all seemed like separate scenes of one magnificent play.

Field Museum of Chicago 50 Years Old

On September 16, 1943, Field Museum of Natural History, Chicago, Ill., was fifty years old. Following are notes on a few outstanding developments during its first half century:

A charter was obtained on September 16, 1893, under the title, Columbian Museum of Chicago. The name was changed in 1894, to Field Columbian Museum, and again changed in 1905, to the present form, Field Museum of Natural History.

Much of the sum originally subscribed in cash—$1,443,408—necessarily had to be expended during the early years to purchase collections, exhibition cases, and equipment, and to defray organizing and administrative expense.

Under the will of Marshall Field, whose death occurred on January 16, 1906, the museum was bequeathed $8,000,000, with the stipulation that $4,000,000 was to be added to the endowment fund and $4,000,000 was to be used for the construction of a new building. This bequest of Mr. Field's brought the total of his gifts to $9,430,000.

For three years prior to completion of the present building, the efforts of the entire staff were devoted to packing the collections and preparing them for transfer from the original edifice in Jackson Park. Actual moving started on April 26, 1920. A railroad spur was built through Jackson Park to the old building, and another was built to the new building, and all of the collections, exhibition cases, and equipment were moved by the use of 321 freight cars and 354 five-ton truck loads. By May 2, 1921, the new museum building was opened.

Since the founding of the museum, 440 expeditions have gone out to all parts of the world, and this number does not include many hundreds of small trips classified as local field work.

The collections shown in exhibition cases are but a small part of the total. In research, the study collections of museums are of the greatest importance. They are used by scientific men from all over the world and are the basis of much of our present-day knowledge. Those at Field Museum rank high both in extent and in usefulness.

During the fifty years under review, the museum has printed 566 scientific publications, most of them the results of its own expeditions and research. It has also published 88 leaflets written in popular style.

Field Museum Library contains approximately 130,000 books and pamphlets on anthropology, botany, geology, zoology, and related subjects, and offers the largest reference collection in its special fields in Chicago.

More Than 33,000,000 Visitors

It is interesting to note that during the museum's occupancy of the old building in Jackson Park, from June 2, 1894, to February 23, 1920, a period of approximately 26 years, the total attendance was 5,839,579, whereas the attendance in the present building from May 2, 1921, to June 16, 1943, approximately 22 years, has been 27,576,728.

Ne Exhibition Methods

The museum has realized the importance of exhibiting all types of material in a way that would attract and educate the layman visitor. It was among the first museums to install animal habitat groups in natural settings.

Clubs Affiliated With the Rocks and Minerals Association

ARIZONA

Mineralogical Society of Arizona
Geo. G. McKhann, Sec., 909 E. Willetta Street, Phoenix.
Meets at the Arizona Museum in Phoenix on the 1st and 3rd Thursday of each month.

CALIFORNIA

East Bay Mineral Society
Miss Ida Chittock, Sec., 1012 Elbert St., Oakland.
Meets on the 1st and 3rd Thursdays of each month (except July and August), at 8:00 p.m., in the Lincoln School Auditorium, 11th and Jackson Sts., Oakland.

Northern California Mineral Society, Inc.
Mrs. Bernice V. Smith, Sec., 1091 Bush St., San Francisco.
Meets on the 3rd Wednesday of the month at the Public Library, San Francisco, at 8:00 p.m.

Pacific Mineral Society
Margaret Cotton, Sec., 2129—9th Ave., Los Angeles.
Meets on the 2nd Friday of each month at 6:30 p.m., at the Hershey Arms Hotel, 2600 Wilshire Blvd., Los Angeles.

Southwest Mineralogists
Dorothy C. Craig, Corres. Sec., 4139 S. Van Ness Ave., Los Angeles.
Meets every Friday at 8:00 p.m., Harvard Playground, 6120 Denker Ave., Los Angeles.

COLORADO

Canon City Geology Club
F. C. Kessler, Sec., 1020 Macon Ave., Canon City.
Meets on the 1st and 2nd Saturdays of each month at 9:00 a.m. in the High School Building, Canon City.

CONNECTICUT

Bridgeport Mineral Club
Miss Georgianna Seward, Sec., 2859 Main St., Bridgeport.
Meets in the Bridgeport Public Library on the 3rd Monday of the month.

Mineralogical Club of Hartford
Miss Gladys L. Gage, Secretary, 239 Newbury St., Hartford.
Meets the 2nd Wednesday of each month, at 8:00 p.m., at 249 High St., Hartford.

New Haven Mineral Club
Mrs. Lillian M. Otersen, Sec., 16 Grove Place, West Haven.
Meets on the 2nd Monday of the month at the Y. W. C. A. on Howe St., New Haven.

IDAHO—OREGON

Snake River Gem Club
Frank S Zimmerman, Sec., Payette, Idaho.
Meets alternately in Payette, Idaho, and Ontario, Oregon, (two small cities on the Snake River) on the 3rd Tuesday of every month.

ILLINOIS

Junior Mineral League
William Dacus, Sec., Morgan Park Junior College, 2153 W. 111th St., Chicago.

MAINE

Maine Mineralogical and Geological Society
Miss Jessie L. Beach, Sec., 6 Allen Avenue, Portland.
Meets last Friday of the month at 8 p.m., at the Northeastern Business College, 97 Danforth Street, Portland.

MASSACHUSETTS

Boston Mineral Club
Miss M. Gertrude Peet, Sec., 8 Willard St., Cambridge.
Meets on the 1st Tuesday of the month at 8:00 p.m., at the New England Museum of Natural History, 234 Berkeley St., Boston.

Connecticut Valley Mineral Club
Mary E. Flahive, Secretary, 96 South St., Florence.
Meets on the 1st Tuesday of each month at 8 p.m. at various institutions in the Connecticut Valley.

MISSOURI

National Geological Club
Mrs. D. P. Stockwell, Pres., Mt. Olympus, Kimmswick.

NEVADA

Reno Rocks and Minerals Study Club
Mrs. Rader L. Thompson, Sec., Box 349, R2, Reno.
Meets on the 1st Wednesday of each month, at 7:30 p.m., at the Mackay School of Mines, Reno.

NEW JERSEY

Newark Mineralogical Society
Louis Reamer, Secretary, 336 Elizabeth St., Orange.
Meets on the 1st Sunday of the month at 3 p.m. at Junior Hall, corner Orange and North 6th Streets, Newark.

New Jersey Mineralogical Society
G. R. Stilwell, Sec., 1023 W. 5th St., Plainfield.
Meets on the 1st Tuesday of the month at 8 p.m. at the Plainfield Public Library.

NEW MEXICO

New Mexico Mineral Society
R. M. Burnet, Sec.-Treas., Carlsbad.

Society of Archaeology, History and Art
Carlsbad.

NEW YORK

Chislers, The
Miss Evelyn Waite, Sponsor, 242 Scarsdale Road, Crestwood, Tuckahoe.

Queens Mineral Society
Mrs. Edward J. Marcin, Sec., 46-30—190th Street, Flushing.
Meets on the 1st Thursday of the month at 8 p.m. at 8501—118th St., Richmond Hill.

Rocks and Minerals Club of Nyack
Miss Ellen Lewin, Sec., c/o Dr. H. V. Krutz, 100 S. Broadway, Nyack.
Meets every Friday afternoon (except during summer) at 3:30 p.m. in the high school science room.

PENNSYLVANIA

Thomas Rock and Mineral Club
Mrs. W. Hersey Thomas, Pres., 145 East Gorgas Lane, Mt. Airy, Philadelphia.
Meets on the 3rd Friday of each month, at 8:00 p.m., at the home of its president, Mrs. Thomas.

TEXAS

Texas Mineral Society
Mrs. A. L. Jarvis, Sec., 353 W. Jefferson Ave., Dallas, Zone 8.
Meets at 8:00 p.m. on 2nd Tuesday of each month at the Baker Hotel, Mezzanine Parlor, Dallas.

VERMONT

Mineralogical Society of Springfield
Victor T. Johnson, Sec., 11 Elm Terrace, Springfield.
Meets on the 3rd Wednesday of each month at 8:00 p.m. at the homes of members.

WISCONSIN

Wisconsin Geological Society
Mrs. J. O. Montague, Sec., 1026 E. Pleasant St., Milwaukee.
Meets on the 1st Monday of each month at 8:00 p.m., at the Public Museum in Milwaukee.

SOUTHERN CALIFORNIA LOCALITIES

By JACK SCHWARTZ

656 South Hendricks Ave., Los Angeles, Calif.

12. Tustin.

Where oh where but in Southern California could one collect minerals right in the middle of an orange grove? Concentration of one's mind on the digging of mineral specimens is certainly difficult when one's nostrils is bombarded with the luscious scent of orange blossoms! But then, what else could one expect in California!

Tustin is in Orange County, the name of the County certainly implying the main crops of this section. It is about three miles east of Santa Ana. Tustin is about 20 miles northwest of the San Juan Capistrano Mission, where the famous swallows come to, as inspired in the recent popular song. Actually migrations of these birds are common in other parts of the United States, but you can see what a little publicity can do for some swallows.

Getting back to minerals, an abandoned mercury mine is situated on a little hill, which is right in the middle of an immense orange grove owned by Mr. and Mrs. Felton Browning. The Brownings worked this mine years ago, but luck was against them. Most of the equipment still stands, a little rusty.

The mercury is derived from metacinnabarite which is mostly a stain on the barite. This barite runs in seams in the rock matrix. A lucky find indeed is a good sized piece of solid metacinnabarite. The dumps of the mine have been picked over too well, so the collector must mine his own specimens. The rock is very hard and the rockhound will have a trying time. Perfect specimens of barite crystals are to be had, but careful manipulations are necessary not to crack them. Native mercury was found, not in the mine, which consists of several small tunnels leading into one open pit, but around the furnaces where apparently it was dropped.

Permission is needed to visit this mine.

Club and Society Notes

Mineralogical Society of Arizona

Our 1943-44 season begins Thursday, Oct. 7th, at 8:00 p.m., at the Arizona Museum, W. Van Buren and 10th Ave., Phoenix, Ariz. The meetings will be held each 1st and 3rd Thursdays, through May. These meetings are always open to the public, and anyone interested in minerals is cordially invited to join the Society. The annual dues are kept as low as possible; juniors are admitted at half price. We are now beginning the new season with the largest membership in the history of the Society.

H. S. Keithley.

Newark Mineralogical Society

The Society will hold its 218th meeting in the Brewster Room, Junior Hall, 468 Orange St., Newark, N. J., on Sunday at 3:00 p.m., Oct. 3, 1943. The program for the afternoon will be a symposium on summer collecting. Visitors are always welcome.

Louis Reamer, Sec.

New Jersey Mineralogical Society

A regular meeting of the Society was held on Tuesday, Sept. 7th, 1943. At the Plainfield Library, Plainfield, N. J. The guest speaker was Mr. Jay T. Fox, of the Fox Museum of Natural History, Seaford, L. I., N. Y., whose subject was "Mineralogical Photomacrography with Kodachrome Film," illustrated with beautiful colored slides.

Two field trips were held by the Society during the summer months. The first one, on Sunday, July 18th, was to Staten Island, N. Y., and the other, on Sunday, Aug. 22nd, to Easton, Penn. Both were very successful, in spite of the small attendance.

Pacific Mineral Society

A dinner meeting of the Society was held on Friday, Sept. 10th, 1943, at the Hershey Arms Hotel, Los Angeles, Calif. The speaker was Mr. Thomas F. Warren, President of Ultra-Violet Products, Inc., whose subject was "Fluorescent Minerals From a Commercial as Well as a Hobby Point of View." A large display of fluorescent minerals were shown by Mr. Warren.

Northern Ohio Guild (American Gem Society)

A regular meeting of the Guild was held on Tuesday, Sept. 14th, 1943, at Western Reserve University, Cleveland, Ohio. The program consisted of a lecture by Dr. Donner of the University on "The Natural Occurrence of Gems and Metals". A question and answer period followed the lecture.

With Our Dealers

E. Mitchell Gunnell, of Denver, Colo., is advertising in this issue some rare sulphides, selenides, and tellurides which are of great interest to advanced collectors. Are you an advanced collector? You will be if you order one of his rare specimens.

Schortmann's Minerals, of Easthampton, Mass., are offering collectors this month an interesting series of some very desirable specimens—also books. You might want something from this list so look up their ad!

Ward's Natural Science Est., Inc., of Rochester, N. Y., are also offering some attractive specimens—a number being from Canada. Canada is an interesting country and so are its minerals—you, too, would be interested if you order some of the specimens.

W. Scott Lewis, of Hollywood, Calif., reports that collectors are buying heavily from his catalog and bulletin. Why shouldn't they? All collectors who take ROCKS AND MINERALS know that he has one of the largest stocks of fine minerals in the country!!

Chuck Jordan, of Los Angeles, Calif., will intrigue many collectors with his advertisement this month. He is featuring—why not turn to his ad and read them yourself?

Sol Shalevetz, of Los Angeles, Calif., has been a collector for the past 10 years and has acquired a large stock of fine minerals. A small classified ad in ROCKS AND MINERALS brought him so many replies that he has decided to branch out as a dealer, under the name of Shales Mineral Supply. Let us show him that he has made no mistake by sending him some nice orders!

Warner & Grieger, of Pasadena, Calif., are again calling the attention of our readers to the fast approaching Christmas season. And again they are suggesting appropriate gifts for Christmas. Pick yours from their list!

J. Gisler & Son, of San Francisco, Calif., are tempting collectors with some choice specimens from their large stock. Are you easily tempted, mineralogically?

Wiener Mineral Co., of Tucson, Ariz., are with us again and this month they are offering collectors a fine series of cubical wulfenites from the Los Lamentos mines of Mexico. Check up this mineral in your collection and if it is missing—order a specimen today!

R. & M. A. HONOR ROLL

★ ★ 74 ★ ★

The following members of the Rocks and Minerals Association are in the armed service of our country. Of the 74 members listed, one is a girl, Miss Eleanor Wales, of Auburndale, Mass. If any errors or omissions occur, please call them to our attention. We would also appreciate if members would notify us of their change in rank, etc., so that they may be properly listed.

Though some members are on foreign soil, the Association has suffered no casualties as far as is known.

Albanese, John S. (Navy), Newark, N. J.
Axtell, R. J. (Col., Army), Indianapolis, Ind.
Bagrowski, B. P. (Corp., Army), Milwaukee, Wisc.
Baker, Leonard E., Jr. (Navy), Glens Falls, N. Y.
Bennett, A. E. (1st Lt., Marines), Freehold, N. J.
Bingham, Wm. (Capt., Army), St. Paul, Minn.
Birman, Joseph (Pvt., Army), Seekonk, Mass.
Bondley, Charles J., Jr. (Lt. Col., Army), ...?
Bridgewater, Robert (Pvt., Army), Norman, Okla.
Brixey, Austin Day, Jr. (Navy), New York, N. Y.
Brown, J. Prescott (Maj., Army), Albany, N. Y.
Brown, Norman S. (Navy) .....?
Campbell, Clyde (Pvt., Army), Harrison, Ohio
Cilen, Anthony (Pvt., Army), Hawthorne, N. J.
Cilen, Joseph (Pvt., Army), Hawthorne, N. J.
Connor, J. H. (Navy), Atlanta, Ga.
Crowley, Richard M. (Army), Philadelphia, Pa.
Currier, Frederick, Jr. (Pvt., Army), Meredith, N. H.
Dailey, T. C. (Pvt., Army), Dayton, Ohio.
Ehrmann, M. L. (Maj., Army), New York, N. Y.
Fine, Sidney A. (Corp., Army) .....?
Gilchrest, J. R. (Lt., Navy), Nyack, N. Y.
Glasser, Frank (Sgt., Army), Grav, Idaho
Graham, D. P, Jr. (Pvt., Army), Silver Spring, Md.
Grieger, John M. (Pvt., Army), Pasadena, Calif.
Hatcher, J. S. (Brig Gen., Army), Falls Church, Va.
Irvin, A. M. (Army), Dexter, Maine
Ives, Ronald F. (1st Lt., Army), Tooele, Utah.
Jelinek, Joseph K. (Pvt., Army), Pasadena, Calif.
Jenni, Clarence M. (Maj, Army), Festus, Mo.
Johl, Max G. (Maj., Army), Groton, Conn.
Kerridge, P. M. (Lt., Navy), Washington, D. C.
Kessler, Dr. Frank (Army), Peekskill, N. Y.
Knox, Arthur S. (Army), W. Somerville, Mass.
Knox, S. C. (Pvt., Army), Atlanta, Ga.
Kobelt, Theodore W. (Army), Wallkill, N. Y.
Komiakoff, Leo (Lt., Army), Poughkeepsie, N. Y.
Livingston, John L. (Capt., Army), Elizabethtown, Ill.
McKeen, J. R. (Navy), Stratford, Conn.
McKinley, Wm. C. (Army), Peoria, Ill.
Mercer, L. P. (Navy), Boulder City, Nev.
Minor, W. C. (Army), Fruita, Colo.
Mixon, Carol (Pvt., Army), Lawrence, Mass.
Molnar, George (Sgt., Army), Perth Amboy, N. J.
Muir, A., Jr. (Corp., Army), Scotch Plains, N. J.
Newell, Jno. G. (Pvt., Army), Wilson, N. C.
Ofstein, A. H. (Pvt., Army), Mattapan, Mass.
Pancoast, B. S. (Sgt., Army), Woodstown, N. J.
Pearl, Richard M. (Corp., Army), Denver, Colo.
Perkins, James M. (Pvt., Army), Bridgeport, Conn.
Pottle, Robert F. (Pvt., Army), Meredith, N. H.
Printz, W. Harold (Pvt., Army), Newport, Ore.
Pugsley, Ken (Corp., Army), Pawling, N. Y.
Randolph, Jack H. (Sgt., Army), ...?
Raynolds, Dr. A. H. (Army), New York, N. Y.
Rhoades, F. S. (Sgt., Army), New York, N. Y.
Sawyer, John A. (Maj., Army), Manhattan, Kans.
Shaub, B. M. (Maj., Army), Northampton, Mass.
Shinkle, J. C. (Lt. Col., Army), Aberdeen, Md.
Smith, T. L. H. (Sgt., Army), Danbury, Conn.
Sober, Harry (Ens., Navy), Washington, D. C.
Spawn, Willman (Pvt., Army), Washington, D. C
Starbird, Leonard H. (1st Lt., Army), Portland, Me.
Stinger, Ed. (Army), ...?
Straley, Arthur (Navy), ...?
Tasman, H. G. (Navy), Nyack, N. Y.
Thompson, Norman (Corp., Army), Chico, Calif.
Thurston, Anthony V. (Pvt., Army), Swansea, Mass.
Wales, Miss Eleanor (Lt., WAACS), Auburndale, Mass.
Watters, Lu (Navy), San Francisco, Calif.
Weight, Harold O. (Sgt., Army), ...?
Wildzunas, John (Corp., Army), Albany, N. Y.
Yaeckel, M. P. (Navy), Claremont, Calif.
Yedlin, Leo Neal (Army), Cedar Grove, Me.

Lloyd McFarling has been released from active duty in the army and has returned to his home in Lincoln, Nebr. He is the first member known to us to have been released from active service.

COLLECTORS' KINKS

Balsa Base for Micro Mounts

Several weeks ago, while mounting some mineral specimens for the microscope, I accidently discovered a method which I believe is better than the one that is generally used. On this particular day I used up all the little blackened corks on which I was mounting the minerals, and, still having some more specimens to mount, I looked about for a substitute. Happily I chose a piece of balsa wood. I found this wood so easy to trim to the right size and shape that I have ever since continually used balsa wood in place of cork, and I never intend to go back to cork.

Thomas N. Walthier.

Classified Advertisements

WORLD'S BEST WANT AD. MEDIUM FOR MINERALS

Rate 3c per word; minimum 20 words. Remittance must accompany copy in all cases. Advertisers must furnish satisfactory references before their advertisements will be inserted. Forms close the 1st of every month.

BOOKS

Handbook For the Amateur Lapidary by J. H. Howard, 16 chapters covering all phases of gem cutting and polishing, 141 pp., 14 illus., price $2.00. J. H. Howard, 504 Crescent Ave., Dept. R., Greenville, S. C.

History and Geology of the Royal Gorge, an illustrated souvenir booklet with maps and drawings locating 54 minerals for touring collectors. 50c postpaid. F. C. Kessler, Cannon City, Colo.

Jewelry, Gem Cutting and Metalcraft—Third edition famous Baxter book just out. $2.75. Write for 1943 price list of American Gem rough. Sample sack 10c. Gem Exchange, Lake Bluff, Illinois.

How to Collect Minerals. By Peter Zodac. A guide book for the collector. 80 pp., 15 illus., $1.00. Rocks and Minerals, Peekskill, N. Y.

EXCHANGES

Something new for the Mineralight. Wernerite, fluoresces rose-red, Manganapatite, fluoresces golden-yellow, Voelckerite, fluoresces dark crimson red. Also a number of rarer Eastern species for exchange. Gunnar Bjareby, 147 Worthington Street, Boston, Mass.

Would Like to Correspond with Collectors who have mineral specimens to trade. Can offer specimens from many New England localities. M. W. Wall, 10 High St., Boston, Mass.

FOSSILS

Fossils, Minerals, Old Arms, Indian Beaded Trappings, prehistoric specimens, general line of curios. Lists 10 cents. N. E. Carter, Elkhorn, Wisc.

MINERALS

Large Dark Purple Amethyst Crystals containing gold; bright sparkling clusters of pyrite crystals; Mt. Mica, Maine, tourmalines. 75c—$2.00 postpaid. Ellenville, N Y., quartz crystals, 50c up. Monroe Mineral Store, Monroe, N. Y.

MINERALS

Lockport Minerals — Selenite, dolomite (pink and white), and creamy calcite crystals. Best quality obtainable. Graphite specimens from Graphite, N. Y. Lists and prices. Write, Paul Killinger, 120 West Winspear Ave., Buffalo, New York.

Beautiful Opals-Direct from Australia. Lapidaries Parcel 10 ounces cutting opal (about 50 stones) $10.00. Collectors specimens—good attractive parcels, $5.00 to $10.00. Dozen small black opals $5.00. 10 ounces small opal chips $5.00. Illustrated catalogue No. 47 free. Natural History Books (thousands), lists free. Norman Seward, "Opal House," Melbourne, Australia.

Mineral Collection for Sale. About 1500 specimens world-wide, with 32 drawer oak cases and lighted display cabinet. Bargain price for quick sale to make space for specialized material. Shown by appointment. Write: Ernest Jaros, 340 West 87th Street, New York (24), N. Y.

25 Ozarks Beauties! 2½ to 3" colorful specimens, each different: rocks, lrusy quartz crystal clusters, many different fossils, the new rose-green and brown-mauve cutting and polishing stones. Send postpaid $2.00. John Jennings, Eureka Springs, Arkansas.

Gem Jasper from Indian Ridge, Ohio. Beautiful pastel colors. Make Lovely Cabochons 2 ounces rough for only 25 cents, or $1.50 per pound postpaid. James W. Riley, Route No. 2, Springfield, Ohio.

Scott Rose Quartz Co.—Rose Quartz Black Hills specimens, all kinds and colors; for rock gardens, cabinets, etc. Boxes: 24 specimens $1.00; 18 specimens, 50c; 15 specimens, 35c. Postage paid. Box 516, Custer, So. Dak. Send for price list.